THE

Malayan Agricultural Journal.

APRIL, 1938.

EDITORIAL.

Tea In June of last year we published an article in this Journal on "The Malayan Tea Industry". The article in question reviewed the position at that time in relation to the participation of Malaya in the International Tea Agreement.

The Agreement which Malaya entered into at the beginning of 1937 terminated at the end of March of this year and negotiations about the conditions under which this country is prepared to enter a new Agreement have been the subject of comment in the Federal Council and in the local press.

As a basis for negotiation the Department of Agriculture has revised and brought up-to-date the Malayan tea statistics. The publication of this information in the present number will be of interest to the industry and an aid in the negotiations.

Those concerned with the planting of tea in Malaya will be interested to learn that, at the suggestion of Government, the United Planting Association of Malaya has formed a committee to appoint a delegate to state their case before the International Tea Committee, and to endeavour to reach mutually satisfactory terms with that body. It must be remembered that the International Tea Committee is an unofficial body; all other countries conduct their negotiations in the first instance through Tea Planters' Associations, and schemes agreed upon by the trade are eventually laid before the Governments for their approval or otherwise. In taking this step, Malaya is therefore only falling into line with the present established practice in this connexion. His Excellency the Governor has nominated the Adviser on Agriculture as an official member of this local committee to represent the small-holders and to act as liaison officer.

While it is hoped that these negotiations will not be protracted, it is inevitable that some time must elapse before an agreement can be announced. Such delay might disorganize the planting progamme of a number of Malayan tea estates, as all licences to plant automatically expired at the end of March 1938, when the present Tea Agreement terminated.

To obviate this difficulty and as a measure of relief of the present labour situation, the Government of the Federated Malay States, in anticipation of an increased area under the next Agreement with the International Tea Committee, is prepared

to consider the issue of new licences to plant up to the end of 1938. As this is a measure of relief of the labour situation, it is to be understood that any licence issued at the present juncture is conditional on the work being put in hand at once.

A review of a recently-published bulletin of the Department of Agriculture entitled "The Cultivation of Lowland Tea at the Central Experiment Station, Serdang" appears in this number. The original intention was to publish a comprehensive book on the tea investigations at Cameron Highlands and at Serdang. The untimely death of the officer in charge of the Highlands work delayed the preparation of the account of the experiments at Cameron Highlands. It has since been prepared from records at the Station and is published in this number. With the special bulletin and this number of the Journal, the tea planter in Malaya possesses an up-to-date statement of the tea industry in this country, and can compare the claims of upland and lowland tea cultivation. Whatever arguments may be advanced for upland or for lowland tea planting, the accounts which we now publish conclusively prove that the cultivation of tea in Malaya is a profitable investment at the prices that have ruled in recent years.

Original Articles.

TEA AT THE AGRICULTURAL STATION, CAMERON HIGHLANDS.

Introductory.

In a recently published Bulletin, (1) an account is given of the cultivation, manufacture, and economics of lowland tea production at the Central Experiment Station, Serdang. An endeavour has been made in the present article to give a similar, though shorter, account of tea at the Agricultural Station, Tanah Rata, Cameron Highlands. As far as possible duplication of description of standard practices common to the Central Experiment Station and Tanah Rata has been avoided, but mention is made of any points in which practices at Tanah Rata differ in detail from those at the Central Experiment Station.

Situation and Climate.

The Agricultural Station is situated at the eastern end of the Tanah Rata valley at an elevation of between 4,700 and 5,000 feet above sea level. Most of the slopes on which tea has been planted have a western or southerly aspect, but as the Station is more or less surrounded by comparatively high hills, there is abundant shelter from high winds.

Temperatures range from about 50°F. at night to maxima of about 70°F. during the day. Occasionally, lower night temperatures have been recorded and freezing-point has been touched once since recording commenced. Seasonal variation is slight and it is very exceptional to experience temperatures below 45°F. or above 77°F.

Rainfall is well distributed throughout the year and at no time is flushing of the tea-bush appreciably delayed through drought. There are, however, fairly well-marked periods of dryer and wetter weather, the dry occurring in January-March and June-September. The total average rainfall is approximately 100 inches per annum, and monthly averages range from a maximum of 13 inches in November to a minimum of $3\frac{1}{2}$ inches in July. Heavy storms are exceptional, and rain is frequently in the form of light drizzle and showers.

Relative humidity, a factor of great importance in the manufacture of tea, is fairly constant though subject to more variation than relative humidity on the plains. Means range from 93 to 95 per cent. saturation at 9 p.m. to 75 to 85 per cent. at 3 p.m. and monthly variation of means is comparatively slight. Exceptionally low humidities occur occasionally, generally during spells of northerly and north-easterly winds, and on a recent occasion a relative humidity as low as 30 per cent. saturation occurred at 2 p.m. Such figures are, however, rare.

More detailed climatic information is published by the Meteorological Department (2) which has maintained a recording station within a few hundred yards of the tea factory since 1925.

Soil.

The soils on which tea is grown at the Agricultural Station fall roughly into two groups. The first consists of weathered and decomposed granite overlaid by several inches of peat. The decomposed granite has become a red clay loam containing a large percentage of sand and gravel. Mechanical composition varies over a wide range, according to the texture of the original granite and in ravines, due to the action of the water resulting in concentration of the sand and the removal of the clay. In mineral foods, this granitic soil is for Malayan soils moderately good, averaging from 0.1 to 0.3 per cent. potash, 0.03 to 0.1 per cent. phosphorus, 0.2 per cent. nitrogen and 0.02 to 0.08 per cent. lime. Owing to the peat layer the organic content is high and averages about 12 per cent. Acidity is within the normal Malayan range, the pH being about 5.0.

The second group of soils consists of weathered quartz, containing usually a little clay washed from the granitic soil, with a peat layer above. These quartz soils consist of little but white sands and on mechanical analysis show less than 10 per cent. silt and clay. They are poor in the extreme, and as might be expected, give a very indifferent growth of tea.

A more detailed account of soils at Cameron Highlands has been published by Dennett ([3]), to which reference should be made for more precise information.

It is frequently supposed that soil wash and erosion is high and in view of the steep slopes it is not unnatural that those accustomed to the tropical downpours of the plains should be so misled. It is surprising, however, to note how little erosion has occurred on areas which were laid down to tea twelve years ago. On one or two small areas on the Station, erosion has been serious but these cases are quite exceptional and even on slopes of 20° to 30° no appreciable loss of top-soil has occurred. This is ascribable primarily to the rarity of heavy rains and secondarily to the peat layer which acts as a sponge and protects the finer particles of soil below. Further, the tea bush fortunately possesses a network of fine rootlets which in no small degree act as soil-binders. In spite of the lack of serious erosion, it is generally considered advisable to establish a cover crop, partly as a safety precaution and partly to prevent erosion of the peaty layer should heavy rain or wind occur after a dry spell has made the surface of the peat dry and powdery.

Planting and Areas.

Planting of tea on the Station commenced in 1926, and proceeded until 1932 by which time 43½ acres had been planted. No accurate survey has been made and acreages as stated must be taken as approximate only. Areas have been measured on the surface only, not on the horizontal in the customary survey manner, a fact which must be taken into account when comparing yields and dressings with those obtaining on commercial gardens where areas are surveyed in the standard manner. This as a factor of importance on steep slopes where surface area may be much greater than that shown on a plan. The areas planted between 1926 and 1932 are as shown below:—

				acres
1926	...	...	...	0.12
1927	...	...	...	4.92
1928	...	...	...	17.12
1929	...	...	...	0.91
1931	...	...	...	15.54
1932	...	...	...	4.94
Total	...	...	...	43.55

Later plantings include 4 acres in 1936-7, 1 acre of which was interplanted with *Aleurites Fordii*, the tung oil tree.

Most of the seed used was obtained from Assam, a number of different gardens supplying the various "jats." The "jats" used and the areas planted with them are as follows:—

	acres		acres		acres
Charali	5.6	Dhonjan	2.3	Mutijan	0.9
Amulguri	0.8	Rajghur	8.3	Arajan	1
Muttipong-Manipuri	0.9	Markong	1.7	China	2
Betjan	2.7	Singhajan	2.6	Local seed	1
Dangri	5.25	Kalijan	0.9	(Parent seed from Ceylon)	

In addition to the above, about 5 acres were planted with a mixture of Markong, Kalijan, Mutijan, Betjan and Arajan, and nearly 3 acres with plants propagated vegetatively (by etiolation) from mixed parents. A further area of $2\frac{1}{2}$ acres of Rajghur was allowed to grow up for seed purposes.

Nursery practice in germination and establishment of seedlings was the same as that described for lowland tea in the previously mentioned bulletin ([1]), except that seedlings were generally transplanted to the field when 9 or 10 months old. In a few exceptional cases, older stumps were utilized, particularly for purposes of supplying. Also, shading of germination beds was found to be unnecessary in the cooler and cloudier conditions of the hills.

A standard planting distance of 4 ft. square was adopted and the rows were planted up-and-down the slopes. Two experiments were laid down in 1932 to test yields obtained at various spacings from 4 x 4 to $3\frac{1}{2}$ x 3 ft., but to date no significant differences have emerged, and on general appearance, convenience, and cost of original planting, it appears that the wider spacing is the most advantageous for the particular local conditions. The 4 x 4 ft. spacing gives a good, even table of tea after about five years provided the soil is of average good quality. On the poor quartzite soils, no semblance of a table has been obtained with this spacing, but planting would not be commercially of any value on such soils.

Cover Crops.

Several species of cover crops have been tried at the Station and the most successful include *Vigna oligosperma*, (*Dolichos Hosei*) and *Indigofera endecaphylla*. The latter has the disadvantage of rank growth. It is apt to grow into the crowns on tea bushes causing partial smothering, especially on slopes where it can grow horizontally into the lower rows of tea. *Vigna*, on the other hand, forms a dense close cover on the surface of the soil, shows no tendency to become rampant, and is almost ideal both for prevention of soil wash and for provision of a layer of decaying vegetable matter on the surface. It is apt to die out as the tea reaches maturity and forms its own shade, but by that time it has performed its main function of protecting the soil while the tea bushes are young.

Shade Trees and Green Manure.

Details of the shade trees and green manures planted for trial may be found in the Guide to the Station (1). A considerable number of species have been tried, but most of them appear to have some disadvantage, and it is becoming increasingly clear that shading of tea is not a necessity at this altitude on Cameron Highlands. *Albizzia moluccana* has made excellent growth, but has given rather too dense a shade and many trees have been removed recently. Another disadvantage is the size attained by this tree and the consequent damage to bushes when removal becomes a necessity. It is possible that trees of this nature are of more value in opening up the soil and providing a means of drainage than for the shade they give or the organic matter they may provide for the soil.

An experiment was laid down in 1933 to compare the effect on yield of inorganic manures and of green manure obtained from pruning of dadaps. Records of yields were kept until recently when the experiment was abandoned owing to the poor growth of dadaps and the paucity of prunings. Apart from this, no experiments on the effect of green manures have been made. The value of growing crops to provide organic matter is questionable where, as on the Station, there is already a considerable quantity of decaying vegetable matter in the soil in the form of peat, and where prunings from the tea bushes themselves are added to the soil at regular intervals.

Since the publication of the Guide, referred to above, in 1934, growth of *Tephrosia Vogelii* has continued to be good. It has a definite value as a contour hedge on the steepest slopes where some erosion is almost sure to occur in due course, as it forms a close hedge which can be further strengthened near ground-level by its own prunings. On good soil, it can be cut back several times a year and gives a heavy crop of foliage and stems which rot readily.

Windbreaks.

As has been previously mentioned, the Station is situated in a sheltered position where wind-damage is rarely, if ever, serious. Occasionally strong winds from the west and south-west blow up the Tanah Rata valley, and as a check to these, *Grevillea robusta*, the Silver Oak of Australia, has been planted in avenue

form along some of the paths. Growth has been good, especially on slopes where good drainage exists, and this tree is satisfactory for its purpose. It gives a little light shade to bushes in the vicinity, but it is not of a spreading nature, and has the further advantage of providing a good leaf-fall.

Plucking.

The process of plucking differs in no material manner from that described in Bulletin 29 (1) as practised at Serdang, except that the plucking cycle is usually made once in nine days, rarely in eight days. A small difference worthy of note is that under Highlands conditions there is less elongation of stem than in the lowlands; consequently leaf and bud form a higher proporton of the total plucking with corresponding increase in the proportion of finer leaf and less "red stem" in the made tea.

Plucking may be commenced during the second year from transplanting, that is to say about three years from the planting of seed in the nursery. During the first two years of plucking, efforts are mainly directed towards shaping the bush in such a way that it attains the maximum spread without becoming more than two to three feet high. Thus the process may be more correctly described as pruning, although the shoots plucked are made into tea, and definite cutting back of woody shoots is practised.

Pruning.

With the object of shaping the young bush satisfactorily, considerable care is necessary both in the amount of young wood removed and in the intervals between removal. In order to determine the optimum pruning periods for young tea, and the optimum amount of wood to leave between cuts, two experiments were laid down in April 1932. Experiment "K" consisted of a Latin Square with the following treatments:—

A. Pruned 1 in. above the previous cut at 3-monthly intervals.
B. Pruned 2 in. above the previous cut at 3-monthly intervals.
C. Pruned 1 in. above the previous cut at 6-monthly intervals.
D. Pruned 2 in. above the previous cut at 6-monthly intervals.

In this experiment, treatments were carried out until October 1933 (*i.e.* for eighteen months). Analyses of yields to March 1935 showed a significant superiority in treatment C, 1 in. pruning at 6-monthly intervals. Observations on shape and appearance confirmed that this was the most satisfactory degree and interval of pruning.

The experiment has been carried on to the present date, but will shortly be closed down as the bushes are approaching maturity and no further useful results are likely to be forthcoming.

Experiment "J" was designed to test the optimum pruning interval combined with manurial treatments in young tea as above. Unlike the previous experiment, analyses to March 1935 showed no significant differences, but possibly this fact may be ascribed to the unsuitable locality of the experiment with consequent

uneven growth of tea and a high experimental error. The late Mr. Curtler left a note to the effect that observations confirmed the result of Experiment "K" in that pruning at 6-monthly intervals appeared to give the most satisfactory results. This experiment is also being terminated.

Having completed the "juvenile" pruning of the bushes eighteen months to two years after transplanting, plucking of crop normally proceeds in the usual manner until the bushes become twiggy and fall off in production of young shoots suitable for the manufacture of tea. Under estate conditions, this state is easily recognizable, and an experienced planter can observe at once when his tea needs a full pruning.

In an endeavour to determine the optimum pruning cycle, several experiments were laid down. The first was commenced in March 1929, and was continued until September 1937. It consisted of two adjacent blocks pruned respectively at 2 and at 3-year intervals. The actual yields recorded are of little value for statistical analysis, but it has long been obvious that the 2-year cycle was unsatisfactory, as the maximum crop is obtained about two years after pruning. The experiment was concluded at the end of 1937.

The second pruning experiment ("L") was designed to test the relation between the period of the pruning cycle and manuring before and after pruning; intervals were $2\frac{1}{2}$, 3, $3\frac{1}{2}$, and 4 years. The experiment was commenced in September 1932. Yield records up to September 1936 showed that the shortest cycle was significantly inferior, thus bearing out the observations of the two adjacent blocks mentioned in the preceding paragraph. No significance between yields of the 3-, $3\frac{1}{2}$- and 4-year cycles has yet been proved, and the experiment is being continued.

In spite of the lack of significance between these figures, observation suggests that, in general, about a $3\frac{1}{2}$-year cycle is the best under Highlands conditions with average plucking. The precise time is bound to vary according to the degree of plucking which has taken place, a heavy plucking naturally causing an excess of twiggy stems and "Banjhi," while a too-light plucking will allow the bushes to grow too high for the plucker to reach the young shoots. The question calls for investigation by yields of experimental plots as it is sufficiently obvious when pruning is required, even though the limits may vary by a year or eighteen months according to individual conditions and to organization of estate routine.

The manner of pruning may be either "clean," in which all the branches are cut back to within a foot of the main stem, or "rim-lung" in which most of the branches of the bush are clean pruned, one or two of the outer branches being left with leaves to act as temporary "lungs" as described on page 7 of Bulletin 29 (1) A somewhat complex experiment ("N") was laid down in February 1934 including a comparison of "clean" and "rim-lung" pruning with manurial treatments and time of application of manures. Results of this experiment are contradictory, as results to August 1935 showed significant superiority of "rim-lung" pruning after manuring, while the following year's results showed "clean" pruning before manuring significantly better than the "rim-lung" after manuring.

In an experiment of this nature where time of pruning of different plots varies, it is clearly unwise to draw any conclusions early, as the period following pruning (when there is no crop to pluck) must influence mean annual yields over several years.

The general practice on the Station has been to "rim-lung" prune and to manure after pruning. General observation now suggests that this may not be the best practice, consequently, the experiment is being modified by manuring all plots before pruning (and manuring none after), and by the introduction of a period of resting the bushes before pruning on some plots while plucking others up to pruning time.

Manuring.

The general practice on the Station has been to apply artificial fertilizers to the crop after pruning, and to apply them down alternate rows. The prunings from the bushes have been placed alternately between rows not receiving artificial fertilizers. After the leaves have fallen from the prunings, they together with the finer twigs have been incorporated in the soil by "envelope-forking." At the next pruning, the alternation of rows is reversed and artificial fertilizers applied between those rows where previously prunings were placed, prunings being placed where applications of fertilizers had previously been made. By this means, the complete area has received a forking and a layer of prunings once in about seven years. In addition to the above it has been customary to apply a dressing of artificial fertilizers to the whole area about the middle of the pruning cycle, *i.e.* about 18 to 24 months after pruning, thus allowng the area two full and two alternate-row dressings in about seven years.

The standard mixture of artificial fertilizers consisted originally of sulphate of ammonia 75 lbs., groundnut cake 107 lbs., bloodmeal 68 lbs., concentrated superphosphate 37½ lbs., and sulphate of potash 31 lbs. per acre. At the end of 1934, following indications of a manurial experiment, an extra 150 lbs. of sulphate of ammonia per acre was substituted for the groundnut cake and bloodmeal as it was thought that the cheaper form of nitrogen was equally effective.

In this connexion, Experiment "B" is of considerable interest, as it was laid down to compare the effect on yields of complete mixtures containing in one case nitrogen in organic form (groundnut cake and bloodmeal), in the second case in inorganic form (sulphate of ammonia), and in the third case as a mixture of inorganic and organic forms. Results from September 1932, when the experiment commenced, to August 1935 showed that all treatments gave significantly higher yields than no treatment at all, but there was no significance between the various manurial mixtures. In 1935 manuring was deliberately omitted, and in 1936 manuring was omitted through an oversight which did not come to light until after analysis of figures. Mean yields obtained between August, 1935, and December, 1936, were higher from the manured plots than from control, but were significantly superior over control only in the case of the plots which had received nitrogen in organic form. The increased yield from organic over inorganic fertilizer, however,

did not even remotely approach the figure at which the high cost of organic manures would have been recovered. Annual mean yields per acre from each treatment are tabulated below:—

Year	Control	Inorganic	Organic	Mixture of Organic and Inorganic.
	lbs.	lbs.	lbs	lbs.
1934	828	987	1,002	967
1935	1,356	1,780	1,749	1,799
1936	1,882	1,959	2,049	2,047
1937	1,081	1,077	1,166	1,065

The experiment is being continued to determine the effect of manuring as the tea becomes older and the soil more exhausted.

Several other experiments have been laid down to compare the value of nitrogenous fertilizers alone against various combinations of nitrogen, phosphorus and potassium and against different quantities of complete fertilizers containing all three of these elements. The results obtained up to the present are so conflicting as to preclude the possibility of making any deductions whatsoever. Several of these experiments are being continued and the situation will doubtless become clearer in course of time when the fields have been in cultivation longer.*

Varieties.

A list of the "jats" and areas under each of them has been enumerated earlier in this article. Many of them appear far from pure in so far as variation from bush to bush is considerable even though the seed of one field comes from only one garden. Most frequent among the variation is a type which appears to be "China hybrid," perhaps originally from Ceylon stock, and characterized by slightly narrower and finer leaves together with abundant flowering and fruiting even in regularly-plucked fields.

In yield, no one "jat" appears to be outstandingly superior to others. Three experiments ("E," "F," and "G") were laid down in November 1932 to compare yields of various "jats," but unfortunately these experiments were sited on poor soil and uneven land, with the result that no conclusive evidence of superiority in

* Field experiments at Tocklai Experiment Station, India, which have been carried on for 17 years, show that sulphate of ammonia gives large increases in yield of tea. Where sulphate of ammonia is used to supply an equal quantity of nitrogen, these increases have been as large or larger than those obtained from organic manures such as oilcake, cattle manure or green manures. Similar results have, moreover, been obtained from experiments in other tea growing countries. At Tocklai, phosphates have had but little effect on yield and potash no effect on yield.—The Application of Science to Modern Tea Culture by P. H. Carpenter. *The Empire Journal of Experimental Agriculture*, Volume VI, No. 21.

yield of any one has been forthcoming so far. It is equally impossible to deduce any satisfactory evidence of relative yielding capacities from a consideration of the yields of individual fields of different "jats," owing to wide soil variation from field to field.

The position is similar with regard to the question of quality of the tea manufactured from different "jats." In 1936, crops of each "jat" were manufactured separately in order to ascertain whether any quality differences were apparent. The difficulties of making accurate and reliable comparisons are, however, almost insurmountable. Quality varies with the age of bushes, the precise stage of growth of the leaf when plucked, the time which has elapsed since pruning, and the weather conditions during manufacture. Furthermore, there is insufficient area of many of the "jats' on the Station to provide a full charge for a roller at any one plucking, with the result that some samples were correctly rolled while others probably were not. It is understood that the late Mr. Curtler was of opinion that "Mutijan" gave the most satisfactory quality, but no written record of this is available, and investigation reveals the fact that "Mutijan" was the only "jat" which was manufactured with a full roller-charge during the tests.

On field characters, many of the "jats" show a bud highly suitable for the manufacture of tippy teas. Some buds are long and firm and well-covered with silky hairs which remain on the young leaf during the earlier stages of unrolling and expansion. As the presence of such buds is by no means confined to one or even several "jats" it is possible that they may be as much a result of local conditions of climate or soil as any inherent character of a variety.

A small area of China tea has made very poor growth, and appears unsuited to local conditions. Many of the leaves develop with a curious twist and are thus deformed without any apparent insect attack. Yields have been much lower than those obtained from Indian "jats."

Yields.

Table I shows the yields obtained from individual fields of the Station, reduced for the sake of uniformity to a basis of made tea (20 per cent. of the yield of fresh leaf) per acre. The average yield at individual ages can be ascertained from this table. There is wide variation in yields owing to soil variations and to the fact that much of the tea was subjected to pruning and other experiments shortly after planting out. The mean can nevertheless be taken as approximately correct for average conditions on the Station.

It will be noted that the first yields are obtained about two years from transplanting, and that they rise steadily until the eight or ninth year when 900 to 1,000 lbs. of made tea per acre may be expected, a very satisfactory yield for tea at the altitude.

Seed-Bearers.

The seed-bearing area consists of $2\frac{1}{2}$ acres of Rajghur "jat," planted in 1931, and 1 acre of Markong "jat" also planted in 1931 but plucked until

1936 and then allowed to grow up for seed purposes. Fifteen maunds of seed (about 1200 lbs.) were collected from the $2\frac{1}{2}$ acre area in 1937, but this cannot be taken in any way as indicative of typical yield, as seed was only collected sporadically when required, and the area is no longer fully planted owing to removal of trees through disease or for other causes. In this connexion it is of interest to record that yields as high as forty maunds of seed per acre have been obtained in one year on a local estate, from seed bearers about eight years old.

Vegetative Propagation.

Experiments in propagation of some of the best bushes by etiolation have been made, and little difficulty is experienced in thus multiplying stock. It has been found to take approximately 6 months for etiolated shoots to form sufficient roots for transplanting. The method having been proved, propagation by this means was discontinued because of the slowness of the process and space required. Plants obtained by this means were utilized as supplies and have made satisfactory growth.

MANUFACTURE OF TEA.

Factory.

The factory as it existed until 1937 is described briefly in the Guide to the Station (4). Owing to increase in crop, enlargement became necessary and the old building was practically demolished and rebuilt with a second storey between July and December 1937. It now consists of an upstairs withering loft with two rooms, separated by a bulking chamber. Each room contains three double banks of withering "tats" of the same size as those previously utilized, while the central bulking chamber is supplied with fans which draw in air, and with a shaft conveying hot air from the furnace below.

Withering.

It is generally possible to obtain a natural wither of the fresh leaf within 48 hours, and enlargement of the space available for this process by the addition of second floor to the building has greatly facilitated such natural withers. Occasionally, when the leaf arrives at the factory in a wet condition, or when continuous rain and a saturated atmosphere lasts for 24 hours or more, it becomes necessary to resort to a little artificial heat. It is usual for the leaf to be in a sufficiently withered state after 36 to 48 hours even in the wettest weather if the temperature of the withering rooms is raised by 8° or 10°F. for a few hours. It is customary to use the minimum heat necessary to cause enough withering before the "tats" are required for a further charge of fresh leaf.

A wither entailing about 50 per cent. loss in weight of the fresh leaf is found to be the most satisfactory, though if a "tippy" tea is required a somewhat harder wither is better (bringing weight of withered leaf down to about 45 per cent. of the weight of fresh leaf), while a lighter wither (withered leaf about 55 per cent. of the weight of fresh leaf) gives a stronger-liquoring made tea. On the Station, it is

customary to make no deductions for moisture on leaf which is wet with rain or dew on arrival at the factory. On this basis, a 45 per cent. wither is aimed at, this figure corresponding roughly to a 50 per cent. wither estimated on a basis of fresh leaf free from surface moisture.

Rolling.

The general programme of rolling as described in the Guide to the Station (1) is still followed. Since the writing of this Guide, a second roller ("Economic" pattern, capacity 150 lbs.) has been installed.

Recently a slight alteration has been made by the separation of tea from the first roll in an attempt to obtain exceptionally "tippy" grades of Broken Orange Pekoe and Fannings. That is to say, it was previously customary to bulk all the fine tea from the first three rollings, whereas two separate grades are now being made, one from the fine leaf from the first rolling and another from the bulked fine leaf from the second and third rollings. The finest tea thus produced appears to have a sufficiency of "tip" to be classed as a "flowery" grade, but none has yet been sold on the London market, consequently the value of this modification in manufacture and grading is as yet undetermined.

Fermentation.

As noted in the Guide (1), it used to be customary to allow fermentation to proceed for some 6 hours. Earlier reports from London brokers show that the teas produced generally received various criticisms, the most frequent being that they were "dull." The time of fermentation was suspected as a possible cause. Varying periods of fermentation were therefore tried between May 1936 and March 1937, samples of the made tea being forwarded to London for valuation and criticism. The detailed reports on these samples are of sufficient interest to be quoted in full.

(1) "A" with four hours fermentation and "B" with six hours fermentation.

Report:—"We definitely prefer "A" as being brighter in the cup, though a little on the light side. "B" samples were inclined to turn slightly grey when milk was added."

(2) "A" with four hours, "B" with five hours, and "C" with six hours fermentation.

Report:—"We are definitely of opinion that the shortest fermentation (4 hours) is the most satisfactory of the three—the liquors are brisker and more pointy —though with possibly a little less colour.....".

(3) "A" with three hours, "B" with four hours, "C" with five hours fermentation.

Report:—"The liquors of teas fermented 5 hours are dull and much inferior to (those of) the other experiments. We have selected samples fermented for 4 hours in preference to the 3 hours fermentation although we are not entirely satisfied with the former.....The 3 hours fermentation samples are admittedly slightly the better of the two but we think that the valuable extra strength from the longer fermentation will more than compensate for the only very slight loss in brightness."

It may be noted that full details of weather conditions were recorded during these experiments in order to rule out as far as practically possible influences of atmospheric condition on the fermenting tea.

As a result of this trial, general time of fermentation has been reduced to about four hours with a resultant improvement in quality of the tea. It must be remembered, however, that modification is frequently necessary according to the state of the atmosphere and the degree of wither undergone by the leaf prior to rolling. With a "hard" wither, lighter fermentation is desirable, while a suitable degree of fermentation is reached more rapidly on a warm, fairly dry day than when cold or rainy conditions prevail. The provision of additional withering space has greatly facilitated working to a standard of about four hours fermentation, as leaf can now be fully withered, a degree which was often unobtainable in the smaller and less well aerated withering room formerly used.

Although a four-hour fermentation has been decided as the most satisfactory standard to which to work, it is still necessary to make full use of the characteristic colour and smell developed in the fermenting leaf. The development of a coppery colour and disappearance of the "green" raw smell of the fresh leaf is always considered in determining the precise period of fermentation.

Firing.

The process of firing is as described in the Guide ([4]), except that it is customary to fire a second time. That is to say, on the first firing the tea is in the dessicator for 12 minutes, commencing temperature being about 125° to 130°F., and final temperature about 200°F. After cooling, it is again fired, but for 8 minutes only with a commencing temperature of about 150°F., and a final temperature again about 200°F. After firing and grading the tea is stored in lead-lined chests until ready to be bulked and repacked for shipment. Little moisture is absorbed during storage, and a final firing before shipment is not normally given.

Grading.

For a detailed description of grading and of the grades made, the reader is again referred to the Guide ([4]), as no material change has been made since this was written, except for the manufacture of the first tea from the first roll separately as described under the section "Rolling."

During the last three months, the average proportions of each grade produced have been as follows:—

		per cent.			per cent.
"Flowery" B.O.P.	...	15.6	P.	...	12.0
B.O.P.	...	13.1	"Flowery" F	...	2.9
B.P.	...	35.3	F.	...	4.4
O.P.	...	12.0	D.	...	4.7

Sieving and grading are done by means of sieves of brass wire. A recent article by Lamb ([5]) has shown that stamped aluminium sieves are probably preferable because less of the black resinous coating on the made tea is removed as dust,

and the quality of the graded tea is thereby enhanced. As a result of this, it is proposed to grade with stamped aluminium sieves in future, and the necessary sieves are on order.

ECONOMICS.

Opening Up.

Planting, maintenance and capital factory costs of the tea on the Agricultural Station are of little value for practical purposes, as many activities other than experiments on and manufacture of tea are carried out, thus making accurate costing difficult and misleading.

For purpose of comparison with lowland tea costs, a rough estimate of the cost of bringing into bearing an economic unit of tea, (say 200 to 300 acres) in the Highlands is shown below: —

		Cost per acre.
		$
Premium on land (a)	...	5.00
Quit rent, 4 years (a)	...	4.00
Survey fees and boundaries	...	2.00
Felling, clearing, burning (Sakai labour) (b)	...	40.00
Nurseries and seed	...	45.00
Propagating of cover crop	...	5.00
Access paths	...	3.00
Access road and bridges (c)	...	10.00
Lining, holing and planting (d)	...	20.00
Weeding, 4 years @ $1/50 per month	...	72.00
Centring, tipping and pruning	...	10.00
Drains, and silt pits, or minor terracing	...	10.00
Cooly lines	...	80.00
Staff accomodation	...	50.00
Factory and machinery	...	120.00
Implements	...	5.00
Miscellaneous and contingencies	...	24.00
Supervision	...	25.00
	Total	$530.00

(a) For 15 years lease, convertible at 15th year to 99 years lease on the payment of $30 per acre. Quit rent is raised to $5 an acre in the ~~fifth~~ and subsequent years.

(b) Costs of a rough clearing, without stumping.

(c) Reckoning two miles of average earth road at about $10 per chain.

(d) Practically no holing is necessary in the average soil of the Highlands.

From the above, it appears that there is little difference between the costs in the Highlands and in the plains of bringing tea into bearing. The total shown above is rather in favour of the Highlands, but account must be taken of the fact that these figures are on the low side. Most of them have been compiled from

information obtained from local owners of tea, some of whom have used second-hand machinery, have made use of modest approach roads or have exercised economy in other directions. $500 to $600 per acre may however be taken as a reasonable figure for the costs of bringing into bearing at about the fourth year of a small estate within reasonable distance of a good road without a resident salaried European manager.

Cost of Making Tea.

Accurate costs for manufacture of tea are kept at the Agricultural Station and may be taken as representative. For the period during which the factory was in action in 1937, average costs were as follows per lb. of made tea:—

		cents	cents
Plucking.—Supervision	...	0.76	
Labour	...	7.05	
			7.81
Factory.— Labour	...	1.70	
Cleaner	...	0.70	
Grading	...	0.35	
Packing (for storage)	...	0.10	
Packing red stem	...	0.70	
			3.55
Engine.— Oil fuel	...	0.54	
Lubrication	...	0.16	
Spares	...	0.20	
			0.90
Firewood.—	...	0.45	
Sundries.—	...	0.06	
			0.51
		Total	12.77

For marketing, the following are the average costs:—

Shipment to London.—

		cents
Cases	...	2.00
Lead	...	1.80
Packing	...	0.06
Delivery to port	...	1.66
Insurance	...	0.27
Ocean freight	...	3.88
Brokerage and charges	...	3.12
Miscellaneous costs	...	0.01
	Total	12.80

For local sale in 1 lb. packages.—

		cents
Paper	...	0.50
Lead	...	3.45
Labour	...	0.80
Solder	...	0.75
Charcoal, flux, miscellaneous	...	0.50
	Total	6.00

In compiling the above costs, no allowance has been made for European supervision or clerical expenses, as these are impossible to estimate accurately on the Agricultural Station. Comparing with costs at Serdang (1), it will be noted that lead and cases are more expensive. This is due to an increase in prices (lead to $25 per cwt., and cases to $1.05 each) since the quoted article was written.

Returns.

Table II gives the highest, lowest and average prices obtained on the London market for all grades of tea for the last five years. Prices have been affected by the restriction scheme.

Acknowledgment.

Most of the information above was accumulated by the late Mr. E. A. Curtler who was in charge of the Station from 1932-1937, and from whose notes the article has been mainly compiled.

References.

(1) Greig, J. L. The Cultivation of Lowland Tea at the Central Experiment Station, Serdang. Bulletin 29, General Series, Department of Agriculture S.S. and F.M.S.

(2) Annual Reports of the Meterological Department, F.M.S. and S.S.

(3) Dennett, J.H. The Soils at Cameron Highlands. *Malayan Agricultural Journal*, Vol. XX 1930, page 20.

(4) Curtler, E.A. Guide to the Experiment Station, Tanah Rata, Cameron Highlands, Bulletin No. 18, General Series, Department of Agriculture S.S. and F.M.S. 1934.

(5) Lamb, J. Grading Tea with Stamped Aluminium Sieves. *The Tea Quarterly*. Tea Research Institute of Ceylon, Vol. X. December 1937, page 191.

Table I.

Calculated Yields of Made Tea per Annum per Acre for each Field Age from Transplanting shown in Years.

Field No.	Area Acres.	Date Planted	Years. 2	3	4	5	6	7	8	9	10	11	12
1	0.12	Jan. 1926	79		179	469	644	633	1017	1558	1158	1358	1842
11	0.35	Nov. 1928		501	440	634	760	1034	749	684			
12	0.36	Oct. 1927	10	266	1306	266	1089	1643	794	1218	1564		
13	0.82	,,	49	259	326	260	459	795	817	838	631		
14	0.93	,,	41	148	128	129	309	777	596	828	916		
15	1.49	,,		30	161	142	314	446	885	1145	906		
16	1.54	Nov. 1928	68	394	41	278	416	748	883	717			
17	1.91	Oct. 1928	115	635	241	252	815	1241	1032	717			
18	0.88	Sept. 1927	53	217	319	174	269	703	584	899	1141		
19	0.94	,,	48	288	885	227	453	833	337	868	914		
20	0.38	Oct. 1927	7	202	535	198	634	998	582	973	1322		
22	0.14	Oct. 1928	214	617	599	1170	679	1749	2733	2148			
24	0.42	Nov. 1928	33	299	210	466	260	744	910	1205			
25	0.99	,,	57	314	243	526	301	884	941	945			
26	0.94	,,	50	210	148	369	586	462	837	1052			
28	0.60	,,	69	301	227	679	894	532	840	1201			
29	0.93	,,	48	214	176	464	631	523	892	1185			
30	0.61	Sept. 1928	183	399	334	922	1073	542	902	1073			
36	0.91	Nov. 1929	209	389	936	1031	793	1322	1249				
37	0.92	Nov. 1928	97	344	307	356	1036	1440	1272	970			
38	0.84	,,	25	106	52	144	405	474	479	325			
39	1.10	,,	23	115	18	161	424	451	517	220			
40	1.01	,,	24	26	32	230	513	315	346	548			
41	1.02	,,	124	375	315	573	718	1092	1049	1059			
42	0.71	,,	317	689	507	921	1169	1198	2027	1455			
48§	0.14	,,	104	498	350	—	54	437	623	399			
49	0.80	,,	149	418	404	817	418	1161	1778	911			
50	0.53	Oct. 1928	27	112	88	614	1132	573	844	1420			
51	0.67	Nov. 1928	26	118	84	153	402	439	548	274			
21	0.70	May 1931		178	589	1323	1307						
23	0.82	,,		141	491	939	635						
31	0.97	,,	52	408	936	947	944						
32	0.89	,,	70	581	960	576	676						
33	0.90	,,	18	201	596	811	575						
34	0.96	June 1931	47	399	892	993	678						
35	0.91	May 1931		375	1069	1167	508						
43	0.86	,,		208	683	1004	714						
44	0.96	June 1931	46	302	677	829	686						
45	0.99	,,	9	258	650	843	577						
46*	0.86	May 1931	189	604	1317	1432	923						
47	1.20	April 1931	90	442	625	433	539						
52‡	2.55	Nov. 1931			217	359	280						
55	1.06	Nov. 1932		42	165	667	789						
56	1.06	,,		31	115	501	694						
57	0.90	,,		38	189	722	923						
58	1.00	,,		44	208	807	968						
59	0.92	,,		24	134	614	827						
		Mean	79	285	428	630	657	834	848	947	1069	1358	1842

§ This field was collar pruned in October 1932; since then the yield recorded above is only half the area, while the remaining area was used for etiolation of shoots.

* This field was pruned in July 1937; since then plucking has been discontinued as it is being left for seed bearers.

‡ This field was originally planted 12ft. x 12ft. for seed bearers. The bushes were pruned down in October 1934. Young stumps were interplanted in December 1936.

Table II.

Prices obtained for Various Grades of Tea per lb. between 1933 and 1937.

Invoice	Date of Sale	B.O.P.	B.P.	O.P.	P.	Fannings.
		pence	pence	pence	pence	pence
	1933					
1	6 Nov. ...	16.0	13.0	11.75	12.25	13.0
	1934					
2	9 April ...	14.50	13.75	13.25	13.25	13.25
3	2 July ...	13.25	13.00	13.00	13.00	12.75
4	19 Sept. ...	11.5	10.75	10.25	10.75	10.75
	1935					
5	14 Jany. ...	12.5	11.5	11.0	10.5	11.25
6	1 May ...	13.5	12.5	11.75	13.25	12.25
8	16 Sept. ...	13.5	12.25	12.25	12.5	13.5
	1936					
9	20 Jany. ...	12.75	12.5	12.75	12.5	13.5
10	1 April ...	13.0	12.5	12.25	13.0	14.0
11	18 May ...	12.25	12.5	13.0	13.25	13.25
12	10 Aug. ...	12.0	11.75	11.75	12.75	13.0
13	14 Sept. ...	12.75	12.5	12.75	13.0	13.0
14	4 Nov. ...	13.0	12.25	12.5	12.5	13.0
	1937					
15	13 Jany. ...	13.5	13.0	12.5	13.0	14.5
16	8 March ...	14.75	14.25	13.75	13.75	15.75
17	24 May ...	15.25	14.75	14.25	14.25	15.75
18	19 July ...	14.75	14.5	13.75	14.0	15.0
19	30 Aug. ...	15.0	14.75	14.0	14.0	15.5
Highest price obtained from each grade ...		16.0	14.75	14.25	14.25	15.75
Lowest price obtained from each grade ...		11.5	10.75	10.25	10.50	10.75
Average price per lb. on the above invoices.		13.54	12.88	12.58	12.86	13.38

Note:—No Invoice No. 7 was sent to London.

THE MALAYAN TEA INDUSTRY IN 1937

BY
D. H. GRIST,
Agricultural Economist.

Prices.

The following table shews the average monthly prices in 1937 obtained for Malayan tea on the London market, and for comparison, the prices obtained on that market for the tea from other countries.

Table I.

Prices per lb.

1937	Malayan				Ceylon	Java	India North	India South	Sumatra
	Number of Breaks		Prices						
	Upland	Lowland	Upland	Lowland					
			s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
January ...	3	9	1 1.42	1 0.04	1 3.52	1 0.16	1 1.30	1 1.09	0 10.96
February ...	1	5	1 3.75	1 1.37	1 4.10	1 1.38	1 1.93	1 2.00	0 11.60
March ...	1	3	1 2.50	1 1.75	1 4.98	1 1.66	1 2.44	1 2.16	1 0.29
April ...	2	8	1 3.75	1 2.38	1 5.51	1 2.57	1 2.91	1 4.15	1 1.00
May ...	2	2	1 3.00	1 2.12	1 4.85	1 1.88	1 2.20	1 3.99	1 0.70
June ...	2	5	1 2.50	1 1.75	1 3.15	1 1.42	1 2.78	1 2.54	1 0.22
July ...	3	6	1 3.00	1 1.75	1 3.22	1 1.59	1 3.25	1 2.50	1 0.40
August ...	2	4	1 3.00	1 2.50	1 3.63	1 2.25	1 5.18	1 2.86	1 0.77
September ...	3	8	1 3.25	1 1.87	1 4.48	1 3.26	1 5.16	1 3.15	1 1.17
October ...	1	6	1 3.75	1 2.62	1 4.87	1 3.06	1 4.12	1 3.48	1 1.16
November ...	2	6	1 3.50	1 1.75	1 3.86	1 1.86	1 2.85	1 2.98	1 0.45
December ...	2	6	1 2.00	1 0.88	1 2.89	1 0.69	1 1.81	1 2.15	0 11.59
	24	68							

The average prices per lb. of Malayan tea on the London market during 1937 were: Upland 1s. 2.9d., Lowland 1s. 1.7d., as compared with Ceylon 1s. 4.00d., Java 1s. 1.76d., India North 1s. 3.05d., India South 1s. 2.69d., Sumatra 1s. 0.20d.

The range of prices of Malayan tea on the London Market was: Upland 1s. 1d. to 1s.3¾d. per lb., Lowland 11¾d. to 1s.3d.

Areas.

Under the International Tea Agreement, Malaya undertook that the area planted between the end of 1936 and 31 March 1938 should not exceed 3,000 acres. The planting of tea was allowed only under licence, and by the end of 1937 licences had been issued for the planting of 2,295 acres. Licences were then due for renewal to cover the first quarter of 1938. In a number of instances licensees were unable to plant the full amount allotted, generally owing to the shortness of time to prepare the land and to raise stock to a suitable size. The area actually planted by the end of 1937 was 801 acres. Licences were renewed to plant 1,020 acres—395 acres Lowlands, 625 acres Highlands—before the end of March 1938, when the present Agreement terminates. As great care has been taken to ensure that applicants did not apply for permission to plant an area larger than is within their means, it is anticipated that practically the whole of this 1,020 acres will be planted by the end of March 1938, so that Malaya will then have a total area of 5,265 acres as against the total of 6,683 acres allowed under the Agreement.

The area of tea on small holdings at the end of 1937 was estimated to be 559 acres, distributed as follows:— Johore 49, acres, Selangor 460 acres, Negri Sembilan 32 acres, Perak 6 acres, Pahang 5 acres, Penang 2 acres, Malacca 4 acres, Province Wellesley 1 acre.

The area of tea on estates, with years of planting, is given in Table II.

Table II.

Area planted with Tea, Malaya.

(Estates only, shewing years of planting)

Acres.

	Before 1930	1930	1931	1932	1933	1934	1935	1936	1937	Total Area	Reserve Land
Upland Estates ...	106	336	163	96	43	53	272	349	623	2,041	3,858
Lowland Estates ...	1,090	186	17	—	—	6	83	85	178	1,645	2,546
Total ...	1,196	522	180	96	43	59	355	434	801	3,686	6,404

The total area of tea in Malaya at the end of 1937 was 4,245 acres (estates 3,686 acres, small holdings 559 acres). The area of reserve land held by registered estates amounts to 6,404 acres. This figure does not, however, represent the total area on which tea may be planted, or which has been alienated for tea-planting.

Production.

The production of tea on estates during 1937 slightly exceeded 1 million lbs., of which 411,544 lbs. were sold locally and 583,052 lbs. exported. Stocks of made tea held by estates at the end of the year amounted to 54,143 lbs., as compared with 48,020 lbs. at the end of 1936. The detailed figures, and comparisons with previous years, are given in Table III.

Table III.

Malayan Production and Exports of Tea.

(Estates only)

in lbs.

Year	Upland			Lowland			Total		
	Produced	Exported	Sold Locally	Produced	Exported	Sold Locally	Produced	Exported	Sold Locally
1930	—	—	—	95,040	35,730	59,310	95,040	35,730	59,310
1931	—	—	—	127,988	31,000	95,662	127,988	31,000	95,662
1932	4,382	—	3,161	138,694	16,472	123,101	143,076	16,472	126,262
1933	39,440	6,990	29,958	172,449	59,952	118,997	211,889	59,942	148,955
1934	115,874	44,072	64,510	228,497	74,843	152,789	344,371	118,915	217,299
1935	212,927	163,787	30,431	418,735	238,189	173,583	631,662	401,976	204,014
1936	327,796	253,308	79,162	616,970	397,074	210,788	944,766	650,382	289,950
1937	373,767	183,026	182,431	627,304	400,026	229,113	1,001,071	583,052	411,544

In view of the fact that the area of new planting in the years 1932-1934 inclusive was small, and would only just be coming into production in 1937, it was not expected that there would be any great increase in production in the year under review. It is probable, however, that the 1935 plantings will affect production figures in 1938.

Imports.

As anticipated, the improved economic position of Malaya resulted in increased tea drinking, and consequent increase in the net imports of tea. The total net imports increased by 1 million lbs. to a total of 4,880,627 lbs., the highest figure reached since 1931, but still greatly below the record figure of 1929. Net imports and values thereof, are given in Table IV.

Table IV.

Net Imports of Tea into Malaya.

Year	Black		Green		Total Net Imports	
	Quantity lbs.	Value $	Quantity lbs.	Value $	Quantity lbs.	Value $
1923	—	—	—	—	6,828,977	2,391,264
1924	—	—	—	—	7,176,274	2,783,349
1925	—	—	—	—	7,825,840	3,138,327
1926	—	—	—	—	9,664,809	3,947,613
1927	—	—	—	—	9,539,195	4,041,901
1928	—	—	—	—	8,647,440	3,769,141
1929	—	—	—	—	10,152,422	3,885,275
1930	—	—	—	—	8,732,453	2,872,220
1931	—	—	—	—	6,845,748	1,665,644
1932	3,498,909	725,119	944,474	290,450	4,443,383	1,015,569
1933	2,404,482	537,059	836,135	317,091	3,240,617	854,150
1934	3,264,661	764,634	1,177,582	472,211	4,422,243	1,236,845
1935	2,674,599	717,118	1,384,957	507,068	4,059,556	1,224,186
1936	2,307,188	408,769	1,587,405	498,135	3,894,593	906,904
1937	2,709,302	440,905	2,171,325	625,962	4,880,627	1,066,867

Imports of black and green tea were not shewn separately prior to 1932.

The gross imports of tea in 1937 were 3,842,393 lbs. black and 2,038, 923 lbs. green tea, a total of 5,881,316 lbs., of which less than 20 per cent. came from countries within the International Tea Agreement.

Consumption.

The consumption of locally-produced estate tea increased in 1937 by 221,594 lbs. to a total of 411,544 lbs., while exports of locally-produced tea declined by 67,330 lbs. to a total of 583,052 lbs.

The total consumption of tea may be taken as the sum of net imports, Malayan estate tea sold locally and estimated production on small holdings. The Malayan consumption in 1937 was therefore about 5,542,000 lbs. as compared with 4,435,000 lbs. in 1936.

An Estimate of Production 1938-1942.

The following estimate of Malayan production of made tea is based on yields of tea obtained at the Central Experiment Station, Serdang, and the Experiment Station, Cameron Highlands, applied to the data of areas planted given in Table II.

Table V.

Estimate of Tea Production in Malaya, 1938-1942.

Lbs. of Made Tea.

	1938	1939	1940	1941	1942
Uplands ...	449,000	545,000	659,000	831,000	1,072,000
Lowlands ...	803,000	994,000	1,205,000	1,271,000	1,444,000
Total ...	1,252,000	1,539,000	1,864,000	2,102,000	2,516,000

Received for publication 16th February 1938.

Reviews.

The Cultivation of Lowland Tea at the Central Experiment Station, Serdang.

By J. L. Greig. Special Bulletin, General Series No. 29, Department of Agriculture, Straits Settlements and Federated Malay States 1937. 31 pp. 8 plates. Price 50 cents (Straits currency) or 1s. 2d. post free.

The present volume gives an account of the experiments on the cultivation of tea conducted at Serdang over a period of 10 years and the system of tea manufacture adopted at the Station, together with the figures of yields for 1936 and estimates for costs of bringing an estate into bearing and of producing made tea. The bulletin is therefore a summarized statement of the investigations of the Department on the production of lowland tea in Malaya and the conclusions given may be taken as an authoritative official statement of the recommendations of the Department of Agriculture on the merits of lowland tea production in Malaya.

The preface states that the original intention was to publish a comprehensive book setting forth the investigations of the Department at Cameron Highlands and at Serdang as the publication of the data from these two Stations would have provided an interesting comparison between highland and lowland tea in Malaya. Owing to the death of the officer in charge of the Highlands' work this course was not adopted. The comparison can, however, be made, as the account of the investigations at Cameron Highlands is published as an article in the *Malayan Agricultural Journal* Vol. XXVI No. 4, April 1938.

Mr. J. L. Greig covers the experiments at the Central Experiment Station, Serdang, through every stage of the field operations of tea growing, and states the history and yields of each block area. Climate, manufacture, costs and sales are treated in detail, leading to his conclusions, in which he states:—

"If tea is established on suitable soil, which has not been impoverished by leaching or previous cultivation, yields of 1,000 lbs. of made tea per acre per annum may be expected and the pruning cycle extended to thirty months and even longer. In areas where soil conditions are poor, or where for any reason the stamina of the bushes is not maintained, extensive attack by termites may be expected.....

"Measures are described which were successful in enabling an area of tea to combat the attacks of termites induced by soil conditions and drought.....

"The price realized (for the sale of made tea) compares favourably with that obtained for teas produced in other more important tea-growing countries."

Much has been said and written regarding the position of Malaya as an actual and potential producer of tea. A perusal of this bulletin will leave the reader in no doubt as to the suitability of this crop to Malayan conditions of soil and climate. The added advantage which Malaya possess of being a considerable consumer of tea—most of which is at present imported—should convince the capitalist who interests himself in Malayan tea production and studies the demand of the local market that with judicious propaganda a good market for the producer is at hand. No difficulty has been experienced in the profitable sale for local consumption of Serdang tea.

D. H. G.

Rubber Growing. Elementary Principles and Practice.

Compiled by A. Moore. Planting Manual No. 7, Rubber Research Institute of Malaya, Kuala Lumpur. 82 pp. Numerous illustrations. January, 1938. Price 50 cents.

The problem of organizing a service which shall enable the Asiatic small-holder to benefit from the results of the research work of the Rubber Research Institute of Malaya was met by the inauguration of a special Small-holders' Advisory Service in 1934. The staff of this Service has been built up by recruiting Asiatics—Malays, Chinese and Indians—trained at the School of Agriculture, Malaya, and at the Institute.

However industrious may be the individuals who form this band of 24 Instructors, they cannot hope to give advice directly to more than a very small proportion of the thousands of owners of holdings planted with rubber, without the assistance of adequate means of propaganda. Hitherto this has been supplied through the Malay, Chinese and Tamil agricultural journals of the Department of Agriculture, and by the lectures, demonstrations, films and lantern-slides which form the "stock in trade" of a rural lecture van, operated jointly by the Departments of Agriculture and Co-operation and the Rubber Research Institute.

The visit of the Caravan to any one district is necessarily rare and continued instruction must therefore rest with the Instructors. As an aid to their work they should find that the latest addition to the literature published by the Rubber Research Institute is of inestimable value. Compiled and prepared for publication by Mr. A. Moore from material supplied by members of the staff of the Rubber Research Institute and in consultation with the Department of Agriculture, S.S. and F.M.S., this book will be of very real service to small-holders and the owners of small rubber estates, and by its publication the Institute responsible has shewn an appreciation of the needs of the Asiatic planter in this country.

In the small compass of about 80 pages the compiler has given a simple statement of the principles and the present position of rubber planting, while the illustrations are not only an added attraction to the volume, but demonstrate the lessons urged in the text.

The writers waste no words in the presentation of facts. This brevity is most commendable for the purposes for which the book is written. A very good instance of this is provided by Chapter 12 under the title "The Selling of Rubber". The chapter consists of 18 lines, the purport of which is to urge that the rubber should be kept clean, dry, and should be graded. The chapter is supported by three photographs. The first shews rubber on the roadside and is accompanied by the legend "Sheet should not be left lying at the roadside. The dust from the road makes it dirty." The second illustration is of loose sheet rubber in a bullock cart, below which we read "When taking sheet to the dealer it should not be carried unprotected on a cart or on the back of a car or bicycle, because in this way it

becomes very dirty". The third illustration is of sheet rubber ready for enclosing in matting. The legend appended states: "Sheets should be kept clean and when taken to the dealer should be wrapped. Matting is suitable for wrapping and can be used many times." The compiler had at his disposal much information on selling rubber which would have made an imposing chapter, but the additional information would have had no bearing on the selling of rubber by small-holders.

The book is published in English and will therefore be more suited for distribution or sale to owners of small estates, as most small-holders cannot speak or read English. The simplicity of the style in which it is written will, however, make it understandable to many with but a small command of the language, and will make the work of translating into the vernacular comparatively easy. Advantage will be taken of the organization of the Department of Agriculture for the production of agricultural information in the Malay, Chinese and Tamil languages and it is anticipated that Mr. Moore's excellent Manual will be available in these languages before the end of this year.

D. H. G.

Fruit.

Compiled by the Intelligence Branch of the Imperial Economic Committee. 84 p. H.M. Stationery Office, London, 2s. 8d. post free.

Malayan interest in this publication centres in the section dealing with canned fruits. The position is reviewed up to the end of 1936, and the report presents a useful summary of the world statistical position and of the share which the Empire holds both as a producer and consumer.

As a consumer of canned fruits the United Kingdom holds first place, importing 86 per cent. of canned fruit from the chief exporting countries. This surprisingly high figure has probably been reached as a result of efficient propaganda. In view of the increasing supplies of canned pineapples being produced in Malaya it would appear that money spent on propaganda in certain other countries might materially assist an industry which seeks, and is in urgent need of, new markets.

The competition of one fruit with another for public favour is stronger at the present time than it has ever been. The reader of this summary should not therefore be content to examine only that portion which concerns the fruit in which he is interested, but should study the report as a whole to enable a comparison to be made of the popularity of certain fruits in particular markets.

Vegetable Oils and Oilseeds.

Imperial Economic Committee, 110 p.p. H.M. Stationery Office, Kingsway, W.C.2, December 1937. Price 2s. 6d. net.

The Intelligence Branch of the Imperial Economic Committee has compiled a summary of figures of production and trade relating to cotton seed, linseed, rapeseed, sesame seed, soya beans, groundnuts, copra, palm kernels, palm oil and olive oil under the above title.

It is pointed out that statistics of area and production of the various oilseeds and nuts are generally too incomplete to permit of a satisfactory estimate of the trend of total world production. Many are annual crops and the amounts of these harvested from year to year fluctuate considerably according to weather conditions in the major producing countries or to price movements. Furthermore, the quantity of most of the oilseeds and nuts exported is small in relation to the total output, owing to consumption in countries of production concerning which it is generally impossible to obtain information.

The statistical information which is offered concerning exports of individual oils and oilseeds from various countries and the destination of these exports is however most comprehensive and provides a valuable guide to the trend of world trade. In the appendices detailed statistics of production in respect of soap, margarine and compound lard are also provided, and striking differences in the method of utilizing oils and fats in the three leading consuming countries are revealed.

F. C. C.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports of Agricultural Officers.

March, 1938.

The Weather

The rainfall was above the average for the month at most stations from which records were received.

This applies more especially to Selangor, Negri Sembilan, the northern part of Malacca and to the East Coast where the precipitation was very considerably in excess of normal for the period.

Remarks on Crops.

Rubber:—The prices offered for smoked sheet by dealers in the rural areas at the end of the month ranged between about $22 and $24 a picul which represents a decline of $4 or $5 a picul during the month. The quotations recorded in reports for coupons per picul equivalent ranged from $12 to $20 and quotations per picul for rubber without coupons exhibit a similar wide range, being from $5 to $10.

It is recorded in several reports that the decline in price has resulted in fewer coolies being employed for tapping on peasant holdings and a tendency for owners to extract only sufficient rubber to cover their coupon quota. The Selangor report records that in that State most holdings can produce their average quota of 55 kati per acre per quarter in one month, and points out that the price of $7 to $9 a picul for uncouponed rubber shows little if any return except by owner-tapping.

The trial grading scheme at Ijok in Kuala Selangor is reported to be running smoothly and 2nd grade rubber is now prepared, whereas formerly it was 3rd or 4th grade. As mentioned last month this experiment is designed to indicate the lines on which any grading scheme for small-holders' rubber is likely to prove successful.

Padi:—Harvesting is practically completed in Kedah, Perak Central, Negri Sembilan and Malacca. In Krian District of Perak and in the Sungei Acheh area of Province Wellesley, wet weather has badly interfered with the harvest and has resulted in high reaping costs and in some loss of grain. Similarly, wet weather has damaged the ripening crop of wet padi in Kelantan.

Harvest is in progress at Sungei Manik in Lower Perak but has not yet begun in the Panchang Bedena and Tanjong Karang areas of Kuala Selangor.

In Krian 35,436 bags of Seraup 48 had been sealed up to the date of writing the March report as a guarantee that it is suitable for the premium of 10 cents a picul offered by the Government Mills for this strain. The inspection of this grain

and sealing of the bags is now working satisfactorily. Not all the padi so sealed find its way to Government Mills, for competition has led some private mills to offer a higher premium for this strain than the Government rate.

In Province Wellesley, Krian and Batu Kurau, Perak, certain cultivators are considering the erection of small power rice mills with the object of milling rice for surrounding cultivators for payment in kind in the form of a fixed percentage of the rice milled. In Batu Kurau a mill has been operating on this system for some time past.

FERTILIZER PRICES, MARCH, 1938.

The following are the prices at the end of March, 1938, of some of the more important fertilizers.

Product.	Analysis				Price per ton $
	Nitrogen (N)	Phosphoric Acid (P_2O_5)		Potash (K_2O)	
		Soluble	Insoluble		
Sulphate of Ammonia ...	20	—	—	—	72.75
Calcium Cyanamide ...	20.6	—	—	—	80.00
Muriate of Potash ...	—	—	—	50	112.00
Sulphate of Potash ...	—	—	—	48	112.00
Superphosphate (concentrated) ...	—	39 - 40	—	—	105.00
Superphosphate ...	—	16 - 18	—	—	60.00
Basic Slag ...	—	16	—	—	48.00
Rock Phosphate (Christmas Island) ...	—	11*	38‡	—	33.50
Rock Phosphate (very finely ground Gafsa) ...	—	11*	26 - 28‡	—	40.00
Lime ...	—	—	—	—	20.00

* Citric soluble. ‡ Total.

Quotation for sulphate of potash is *ex* warehouse, Port Swettenham F.M.S. or Singapore. All other quotations are *ex* warehouse Port Swettenham, Klang or Singapore.

DEPARTMENTAL NOTES.

Tour of the Rural Lecture Caravan.

The Rural Lecture Caravan, operated jointly by the Department of Agriculture, the Co-operative Department and the Rubber Research Institute of Malaya, carried out a successful tour of the Perak Central Circle between 20th February and 9th March 1938 and, in all, ten centres were visited. With one exception, the Caravan remained in each centre for two days.

The programme of lectures and films was varied in different centres to suit local agricultural conditions. As experience gained elsewhere shewed that afternoon lectures were poorly attended, no lectures were given in the afternoon but the subjects were included in the evening programme. It is estimated that the total attendance during the tour exceeded 15,000 people.

The system of interspersing educational subjects with items of a lighter nature finds favour. A film depicting the Coronation of H.M. King George VI is extremely popular wherever shewn, while the film concerning the Malay Regiment is also a favourite. This lighter entertainment not only makes the educational film and lantern lectures more palatable, but is of undoubted value in itself in giving a wider outlook on world affairs and making the peasantry more receptive of innovations in agricultural practice and co-operative ideas.

A visit to a district is treated as a prelude to a more intensive campaign in which by personal visits and demonstrations the officers concerned seek to ensure that there shall be a practical application of the propaganda for which the Caravan organization is responsible.

The response to this method of propaganda varies, but there can be no doubt that the Rural Lecture Caravan is serving its purpose in bringing to the villages some appreciation of the improvements in rural conditions that are possible.

Leave

Major C. D. V. Georgi, O.B.E., (Senior Chemist) has been granted 273 days leave from 12th March to 9th December, 1938. Dr. T. A. Buckley, Chemist, will act as Senior Chemist during the absence of Major Georgi.

Mr. G. E. Mann, M.C., Principal School of Agriculture, Malaya, returned from leave on 24th March, 1938.

MEETING OF THE AGRICULTURAL ADVISORY COMMITTEE HELD ON 3rd MARCH, 1938.

A meeting of the Agricultural Advisory Committee was held at the Department of Agriculture, Kuala Lumpur, on 3rd March 1938, at which Sir Frank A. Stockdale, K.C.M.G., C.B.E., Agricultural Adviser to the Secretary of State for the Colonies, was present. The Adviser on Agriculture, Malay States, (The Hon'ble Mr. O. T. Faulkner, C.M.G.) took the chair.

The following are some of the more important matters discussed at the meeting.

The Coconut Industry.—The Committee was informed of the position regarding the small inexpensive copra kilns designed for the use of small-holders and small producers of copra.

Under the conditions obtaining during the original trials at Klang it was possible to obtain dry white copra in under 24 hours leaving a quantity of shell fuel after each run, surplus to requirements.

Subsequently, however, it was found that these results could not be repeated under all conditions in the field if the original working programme was strictly adhered to, although dry, white copra could be obtained if the operating time was increased or if more fuel was used.

The kilns have since been proved to be sensitive to changes in the conditions of operation while it is suspected also that the character of the meat of the coconut varies seasonally and in different localities. Investigations are therefore being continued.

Copra grading and the increased shipping freights on copra were also discussed.

The Pineapple Industry.—The Chairman reported that a start had been made in erecting a model pineapple factory and laboratory at Johore Bahru.

Regulations governing standard can sizes have been published in the Gazettes, and the three States concerned have agreed in principle to all the important features of a pineapple grading scheme. Other points discussed were the accumulation of stocks of canned pineapples and new markets for Malayan pineapples.

Tea.—The meeting was informed of the present position of tea restriction negotiations. The possibility of production locally of green tea to satisfy at least part of the local demand was discussed.

Anti-Erosion Measures in Malaya.—A summary of the present position has been circulated to the Committee. The Chairman pointed out that though the existing legislation appears superficially to be adequate, its enforcement is a matter of some administrative difficulty and undertook to give further consideration to the matter.

The Director, Rubber Research Institute of Malaya, asked whether, in view of the large amount of rubber replanting now being undertaken, and the proposal to allow new planting after 1938, it would not be desirable if anti-erosion measures were laid down in the conditions under which replanting and new planting were permitted under the new Rubber Regulation. After discussion the Meeting agreed that the Adviser on Agriculture and the Director, Rubber Research Institute, should discuss the matter further with a view to approaching Government on the subject.

At the invitation of the Chairman, Sir Frank Stockdale gave in confidence a preliminary outline of the views on Malayan agriculture in general which he had formed during his tour of the country. Various points arising therefrom were discussed.

STANDARD CANS FOR PINEAPPLES

Regulations have been brought into force in the Straits Settlements, Federated Malay States and Johore under Pineapple Industry Ordinances or Enactment* to standardize the size of can used for the packing of pineapples. The regulations do not apply to any can which is of such a size that its gross weight when filled is $3\frac{1}{4}$ lbs. or over, nor to cans of pineapple juice.

The following are the ten specifications of cans:—

Type or description of can	Overall diameter inches	Overall height inches
$\frac{3}{4}$ lb. Squat ...	3 7/16	2 3/16
1 lb. Tall ...	3 1/16	3 13/16
1 lb. Squat ...	3 13/16	2 5/16
$1\frac{1}{4}$ lb. Tall ...	3 1/16	4 1/2
$1\frac{1}{4}$ lb. Squat ...	4 1/16	2 11/16
$1\frac{1}{2}$ lb. Tall ...	3 7/16	4 1/4
$1\frac{1}{2}$ lb. Squat ...	4 5/16	2 3/4
2 lb. Tall ...	3 13/16	4 3/8
$2\frac{1}{2}$ lb. Tall ...	4 1/16	4 7/8
3 lb. Tall ...	4 5/16	5 1/2

*F.M.S. Notification No. 896. F.M.S. Government Gazette of 1 March 1938. Enforced from 1 March 1938.

S.S. Notification No. 272. S.S. Government Gazette of 28 January 1938. Enforced from 1 May 1938.

Johore Notification No. 1391. Johore Government Gazette of 29 December 1937. Enforced from 1 March 1938.

Statistical.

MARKET PRICES.

March 1938.

Major Crops.

Rubber:—The month was notable for the severe fall in the rubber market, the closing price of 16⅜ cents being the lowest since the pre-restriction period of 1934. Spot loose opened in Singapore at 23⅜ cents per lb.; there was a gradual weakening throughout the month, the price falling to 20 cents on the 24th and, after a slight recovery, to 17⅛ cents on the 30th and 16⅜ cents at the close.

The average price for the month of No. 1. X. Rubber Smoked Sheet was 21.74 cents per lb., as compared with 23.13 cents in February. The London average price was 6.69 pence per lb., and the New York price 13.62 cents gold, as compared with 7.03 pence and 14.65 cents gold in the previous month.

Prices paid for small-holders' rubber at three centres during the month are shewn in Table 1.

Table I.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, March, 1938.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.			Kuala Kangsar, Perak.		Batu Pahat, Johore.				
	3	10	17	23	30	2	9	16	23	30
Smoked sheet	28.00	27.60	27.80	20.90	23.00					
Unsmoked sheet		26.00			20.00	24.96	25.10	25.50	22.59	18.09
Scrap										

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

No purchases at Kuala Kangsar on the 2nd, 9th and 16th March, and at Kuala Pilah on the 24th and 31st March.

Palm Oil.—Prices again weakened during March as shewn in Table II.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1938	Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
March 4	£ 16. 5. 0	£ 9. 15. 0
„ 11	16. 0. 0	9. 10. 0
„ 18	15. 5. 0	9. 7. 6
„ 25	14. 10. 0	9. 5. 0

Copra.—The slight recovery in the copra market was not maintained, and Singapore prices fell steadily throughout the month from $3.90 per picul on opening to $3.55 at the close. The average price for the month for the sun-dried grade was $3.68 per picul, the mixed grade again being 40 cents per picul lower. The February average price was $3.75 per picul.

Copra cake was unchanged at $1.80 per picul.

Rice.—The average wholesale Singapore prices of rice per picul in February were as follows:— Siam No. 2 (ordinary) $4.15; Rangoon No. 1 $3.82; Saigon No. 1 $3.92; as compared with $4.11, $3.95 and $4 in January, and with $4.66, $3.67 and $4.02 in February 1937.

The average retail prices in cents per gantang of No. 2 Siam rice were unchanged from January and were:— Singapore 28, Penang 32, Malacca 28.

The average declared trade value of imports during February was $3.85 per picul as compared with $4.04 in January and $3.98 in December.

Padi.—The Government Rice Mills, Perak, continued to pay $2.10 per picul for padi, and retail prices in various parts of the Peninsula ranged from 6 to 14 cents per gantang.

Pineapples.—There was no change in the prices of canned pineapples per case during March, and they were:— G.A.Q.: Cubes $2.70, Sliced Flat $2.65, Sliced Tall $2.80; Golden Quality: $2.85, $2.80 and 2.95 respectively.

Prices of fresh fruit per 100 for canning were as follows:— Singapore 80 cents to $1.50; Johore 1st quality 90 cents to $1.30, 2nd quality 60 to 90 cents, 3rd quality 40 to 60 cents.

Beverages.

Tea.—Five consignments of Malayan tea were sold on the London market during March. Two consignments of upland tea averaged 1s. $2\frac{3}{4}$d. and 1s. 3d. per lb., and the lowland tea averaged from 1s. $0\frac{1}{2}$d. to 1s. 2d.

Average London prices per lb. during March for consignments of tea from other countries were as follows:— Ceylon 1s. 4.87d., Java 1s. 0.92d., Indian Northern 1s. 1.84d., Indian Southern 1s. 3.68d., Sumatra 11.93d.

The latest Colombo average prices available, quoted from *The Weekly Tea Market Report*, 29th March 1938, of the Colombo Brokers' Association, are as follows, in rupee cents per lb.: High Grown Teas 82 cents, Medium Grown Teas 71 cents, Low Grown Teas 64 cents.

Coffee.—Prices of Palembang and Sourabaya coffee were considerably lower during the month than in February. Sourabaya averaged $10.95 to $11.75 per picul and Palembang $7 to $8, as compared with $13.12 to $14.12 and $10.23 to $11.30 respectively.

Prices in Singapore of other varieties of coffee were as follows (per picul):— Liberian $14, rising to $14.50, closing at $14; Excelsa $10, improving to $10.50; Robusta $7, falling to $6.50.

Spices.

Arecanuts.—The range of Singapore prices per picul during March was as follows:— Splits $5 to $6.85; Red Whole $5.15 to $6.30; Sliced $7 to $8.57.

The averages of the Singapore Chamber of Commerce quotations per picul were:— Best $7.88, Medium $7.83, Mixed $6.88.

Pepper.—No interest was shewn in the pepper market during March and prices fell again. Average prices per picul for the month were as follows:— Singapore Black $8.75, Singapore White $14.56, Muntok White $15.06, as compared with $9, $14.50 and $15 respectively in February.

Nutmegs.—The Singapore market fell still further during March, and the average price per picul for both 110's and 80's was $30.50 as compared with $34.50 in February.

Mace.—Siouw was quoted throughout the month at $90 per picul, and Amboina at $75, as compared with $95 and $75 in February.

Cloves.—Zanzibar and Amboina continued to be quoted nominally at $40 per picul.

Cardamoms.—Green cardamoms were quoted in the Ceylon Chamber of Commerce reports for March at Rs. 1.08 - Rs. 1.28 rising to Rs. 1.15 - Rs. 1.31 per lb.

Miscellaneous.

Derris (Tuba Root).—Roots sold on rotenone content averaged $24 per picul as compared with $22 in February, and roots sold on a basis of ether extract continued unchanged at $14 per picul.

Gambier.—Prices fell still further during March and averages for the month were Block $7.38 per picul and No. 1 Cube $15.88, as compared with $7.56 and $16 respectively in February.

Tapioca.—Prices remained unchanged during March and were, per picul:—Flake Fair $4.25, Seed Pearl $4.80, Medium Pearl $5.20.

Sago.—There was a slight improvement in sago prices during March. Pearl, Small Fair, averaged $4.06 per picul and Flour, Sarawak Fair, averaged $2.37, as compared with $4.02 and $2.35 respectively in February.

Tobacco.—In Johore, prepared tobacco ranged from $30 to $100 per picul. In Kelantan the range was: 1st quality $100, 2nd quality $82.50, 3rd quality $62.50. The corresponding range in Negri Sembilan was: $58, $48, $38. The general range of prices for dried leaf was: 1st quality $24 to $47, 2nd quality $29 to $38, 3rd quality $20 to $30.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for imported coffee and arecanuts by the Lianqui Trading Company of Singapore, and derris prices by Messrs. Kohyei & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and fourpence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57 Trafalgar Square, London, W.C. 2

GENERAL RICE SUMMARY*

February 1938.

Malaya.—Imports of foreign rice during the month were 68,900 tons† and exports 16,498 tons; net imports were accordingly 52,402 tons as compared with 51,230 tons in 1937¶.

Of the February imports 53 per cent. were consigned to Singapore, 15 per cent. to Penang, 7 per cent. to Malacca, 22 per cent. to the Federated Malay States and 3 per cent. to the Unfederated Malay States. The foreign imports by countries of origin were as follows (in tons, percentages in brackets):—Siam 44,583 (64.7), Burma 20,918 (30.4), French Indo-China 2,482 (3.6), other countries 917 (1.3).

Of the imports during February 76 per cent. were consigned to the Netherlands Indies and 24 per cent. to other countries. The various kinds of rice exported were as follows (in tons, percentages in brackets):—Siam 12,045 (73.0), Burma 3,659 (22.2), French Indo-China 629 (3.8), parboiled 57 (0.3), local production 108 (0.7).

India and Burma:—Exports from India during January were 18,000 tons as compared with 114,000 tons in 1937, a decrease of 84.2 per cent. Of these, nil (2.6) per cent. were to the United Kingdom, nil (2.6) per cent. to the Continent of Europe, 50.0 (47.4) per cent. to Ceylon, 5.6 (30.7) per cent. to the Straits Settlements and the Far East, and 44.4 (16.7) per cent. to other countries. The figures in brackets are for 1937.

According to the *Indian Trade Journal,* 3rd March, 1938, in the final rice forecast of All-India for the season 1937-38 the area and yield are estimated at 71,992,000 acres and 26,544,000 tons, shewing a decrease of 527,000 acres (or 0.7 per cent.) in area and 1,340,000 tons (or 4.8 per cent.) in yield as compared with the corresponding crop in the previous season.

Burma's foreign exports from 1st January to 23rd February were 420,173 tons as compared with 491,232 tons in 1937, a decrease of 14.5 per cent.

Of these exports 50.9 (50.6) per cent. were to India, 10.1 (10.3) per cent. to the United Kingdom, 1.2 (2.3) per cent. to the Continent of Europe, 17.0 (14.6) per cent. to Ceylon, 15.9 (15.4) per cent. to the Straits Settlements and the Far East, and 4.9 (6.8) per cent. to other countries. The percentages in brackets are in respect of 1937.

Siam.—Exports of rice and rice products from Bangkok during December were 92,776 tons; the total exports for the year 1937 were 943,224 tons as compared with 1,583,165 tons in 1936.

Japan.—According to a communication dated 9th February 1938, received from the British Embassy in Tokyo, the actual rice crop of Japan for the year 1937

* Abridged from the Rice Summary for February 1938 compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† Ton = long ton (2,240 lbs.)

¶ It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1936 or 1937.

was 9,301,505 tons, a decrease of 143,053 tons or 1.5 per cent. as compared with the actual crop for 1936.

The actual rice crop of Korea for 1937 is placed at 3,758,338 tons, an increase of 1,035,931 tons or 38.1 per cent. over 1936.

The yield of the second rice crop of Formosa for the year 1937 is estimated at 676,231 tons, a decrease of 26,828 tons or 3.8 per cent. as compared with 1936.

French Indo-China.—Entries of padi into Cholon during January and February totalled 254,367 tons as compared with 268,131 tons in 1937, a decrease of 5.1 per cent. Exports of rice were 244,175 tons as compared with 200,619 tons in 1937,an increase of 21.7 per cent.

The Netherlands Indies.—The latest information available was published in the October Summary.

Ceylon:—Imports of rice during January and February totalled 88,249 tons as compared with 100,543 tons in 1937, a decrease of 12.2 per cent. Of these imports 13.8 (8.8) per cent. were from British India, 76.1 (64.3) per cent. from Burma, 1.1 (nil) per cent. from the Straits Settlements, and 9.0 (26.9) per cent. from other countries. The percentages in brackets are the corresponding figures for 1937.

Europe and America.—Shipments to Europe from the East from the 1st January to 4th February were 13,567 tons as compared with 16,044 tons in 1937, a decrease of 15.4 per cent. Of these shipments 8.9 (33.7) per cent. were from Burma, 52.1 (nil) per cent. from Saigon, 36.0 (49.8) per cent. from Siam, and 3.0 (16.5) per cent. from Bengal. The figures in brackets are the corresponding percentages for 1937.

Shipments for the Levant from the 1st to 15th January were 482 tons as compared with 124 tons in 1937. Shipments for Cuba, West Indies and America from 1st to 31st January were 9,532 tons as compared with 5,230 tons in 1937.

MALAYAN AGRICULTURAL EXPORTS, FEBRUARY, 1938.

PRODUCT.	Net Exports in Tons				
	Year 1937	Jan./Feb. 1937	Jan./Feb. 1938	February 1937	February 1938
Arecanuts ...	30,084	5,326	6,881	1,239	3,797
Coconuts fresh † ...	95,223†	11,441†	12,011†	6.502†	6.968†
Coconut oil ...	39,762	5,964	6,892	3,385	3,834
Copra ...	75,592	8,035	6,737	3,760	1,047
Gambier, all kinds ...	1,955	338	245	212	64
Copra cake ...	15,026§	2,284§	683	1,187§	30
Palm kernels ...	7,312	1,031	1,171	437	475
Palm oil ...	42,787	5,562	7,259	3,740	2,765
Pineapples canned ...	80,502	12,290	11,444	5,974	5,813
Rubber ¶ ...	503,127¶	74,668	72,483¶	34,759¶	32,459¶
Sago,—flour ...	15,478	3,031	506	1,219	467
,, —pearl ...	3,759	631	634	317	244
,, —raw ...	8,256*	1,179*	1,155*	588*	656*
Tapioca,—flake ...	1,058	231	192	88	91
,, —flour ...	2,393*	434*	606*	411*	359*
,, —pearl ...	18,786	2,644	2,146	769	885
Tuba root ...	573	140	53	46	28

† hundreds in number. * net imports. ¶ production. § gross exports.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS

(In long tons, as declared by Estates)

Month 1938	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January	2,241.7	1,309.2	383.7	232.0
February	2,040.4	1,457.1	370.4	261.0
Total ...	4,282.1	2,766.3	754.1	493.0
Total Jan. and Feb., 1937 ...	3,744.4	2,716.8	684.0	464.7
Total for the year 1937 ...	27,733.5	17,932.8	5,094.7	2,811.4

Stocks on estates as at 28th February, 1938 were :palm oil 3,789 tons, palm kernels 678 tons.

MALAYAN RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER ACTUALLY TAPPED AND NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 28TH FEBRUARY, 1938.

STATE OR TERRITORY	Estimated Acreages of Tappable Rubber	Actual area tapped during the month Acreage	Percentage of (3) to (2)	ACREAGES OF TAPPABLE RUBBER NOT TAPPED						AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total area not tapped (5) + (7) + (9)	Percentage of (13) to (2)
				ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		On estates which have partly ceased tapping							
						Otherwise than under rotational systems		Under rotational systems					
				Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)	Acreage	Percentage of (9) to (2)	Acreage	Percentage of (11) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
S. S.—													
Province Wellesley ...	43,580	24,622	56.5	375	0.8	9,753	22.4	8,830	20.3	438	1.0	18,958	43.5
Malacca ...	122,313	76,101	62.2	1,755	1.4	12,935	10.6	31,522	25.8	2,069	1.7	46,212	37.8
Penang ...	2,487	1,606	64.6	—	—	821	33.0	60	2.4	72	2.9	881	35.4
Singapore ...	32,743	20,417	62.4	1,978	6.0	5,816	17.8	4,532	13.8	190	0.6	12,326	37.6
Total S.S. ...	201,123	122,746	61.0	4,108	2.0	29,325	14.6	44,944	22.4	2,769	1.4	78,377	39.0
F. M. S.—													
Perak ...	289,053	194,393	67.3	1,051	0.3	36,967	12.8	56,642	19.6	7,278	2.5	94,660	32.7
Selangor ...	329,697	238,722	72.4	1,687	0.5	28,649	8.7	60,639	18.4	6,871	2.1	90,975	27.6
Negri Sembilan ...	256,436	174,824	68.2	3,607	1.4	27,663	10.8	50,342	19.6	8,004	3.1	81,612	31.8
Pahang ...	85,959	57,709	67.1	1,507	1.8	17,354	20.2	9,389	10.9	7,717	9.0	28,250	32.9
Total F.M.S. ...	961,145	665,648	69.3	7,852	0.8	110,633	11.5	177,012	18.4	29,870	3.1	295,497	30.7
U. M. S.—													
Johore ...	476,107	340,512	71.5	3,900	0.8	60,947	12.8	70,748	14.9	34,296	7.2	135,595	28.5
Kedah ...	198,175	145,068	73.2	3,595	1.8	13,039	6.6	36,473	18.4	5,899	3.0	53,107	26.8
Kelantan ...	31,304	21,953	70.1	243	0.8	5,320	17.0	3,788	12.1	2,514	8.0	9,351	29.9
Trengganu (*b*) ...	4,817	3,178	66.0	—	—	74	1.5	1,565	32.5	74	1.5	1,639	34.0
Perlis (*c*) ...	1,347	800	59.4	—	—	94	7.0	453	33.6	94	7.0	547	40.6
Brunei ...	4,979	3,353	67.4	—	—	713	14.3	913	18.3	974	19.6	1,626	32.6
Total U.M.S. ...	716,729	514,864	71.8	7,738	1.1	80,187	11.2	113,940	15.9	43,851	6.1	201,865	28.2
Total MALAYA ...	1,878,997	1,303,258	69.4	19,698	1.0	220,145	11.7	335,896	17.9	76,490	4.1	575,739	30.6

Notes:—(*a*) The acreage shown in column (11) is included in columns (5) and (7).
(*b*) Registered companies only.
(*c*) Rendered quarterly.

MALAYAN RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF FEBRUARY, 1938 IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		January and Feb. 1938		during the month		January and Feb. 1938						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. and Feb. 1938	during the month	Jan. and Feb. 1938	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. and Feb. 1938
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	11,892	14,808	11,786	26,018	4,455	11,609	Nil	Nil	Nil	Nil	13,411	3,758	26,398	8,586	...	10,733	15,026	13	31
Johore ...	...	3,547	5,403	5,655	11,702	2,447	5,644	Nil	30	Nil	61	3,858	4,231	6,326	11,722	...	3,208	5,785	...	...
Kedah ...	...	458	3,910	2,900	6,654	831	2,159	Nil	Nil	Nil	Nil	1,759	1,979	4,203	4,378	...	377	3,984	...	...
Perlis ...	...	14	22	12	29	20	51	Nil	Nil	Nil	Nil	Nil	31	Nil	68	...	13	24	...	...
Kelantan ...	...	751	295	401	778	792	1,203	Nil	Nil	Nil	Nil	192	952	404	1,568	...	744	351	...	...
Trengganu ...	...	55	50	213	510	107	255	Nil	Nil	Nil	Nil	Nil	320	Nil	765	...	55	50	...	...
Brunei ...	...	18	78	60	116	76	131	...	...	...	...	...	143	...	233	...	18	71	...	...
Total Malay States	...	16,735	24,566	21,027	45,807	8,728	21,052	Nil	30	Nil	61	19,220	11,414	37,331	27,320	...	15,148	25,291	13	31
S. SETTLEMENTS :—																				
Malacca ...	...	2,693	1,410	1,148	2,657	523	907	Nil		Nil		2,703		4,486		...	2,465	1,299	...	...
Province Wellesley	...	3,035	892	430	1,014	267	418	Nil		Nil		8,644		19,137		...	2,641	822	...	...
Penang ...	2,306	6,297	15	21	47	72	133	2,288	12,973	5,130	28,673		Nil		Nil	2,215	6,182	10	...	...
Singapore ...	6,386	33,525	256	168	347	58	82	9,555		23,710		18,332		35,931		6,604	31,259	268	22	47
Labuan ...	...	40	Nil	Nil	Nil	17	19	31		112		Nil		Nil		...	46	Nil	...	...
Total Straits Settlements ...	8,692	45,590	2,574	1,767	4,065	937	1,559	11,874	12,973	28,952	28,673	29,679	Nil	59,554	Nil	8,819	42,593	2,399	22	47
Total Malaya ...	8,692	62,325	27,140	22,794	49,872	9,665	22,611	11,874	13,003	28,952	28,734	48,899	11,414	96,885	27,320	8,819	57,741	27,690	35	78

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	9,775	30,130	5,883	4,828	2,548	209
WET RUBBER	958	1,129	299	342	660	168
TOTAL ...	10,733	31,259	6,182	5,170	3,208	377

TABLE III
FOREIGN EXPORTS

PORTS	For month	Jan.&Feb. 1938
29	30	31
Singapore ...	32,184	61,762
Penang ...	12,007	26,781
Port Swettenham.	4,481	8,025
Malacca ...	227	317
MALAYA ...	48,899	96,885

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	Jan.&Feb. 1938
32	33	34
Malay States ...	30,561	64,457
Straits Settlements	2,901	5,707
MALAYA ...	33,462	70,164

Notes :—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption. *i. e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S and F.M.S., at Singapore on 24th March, 1938

METEOROLOGICAL SUMMARY, MALAYA, FEBRUARY, 1938.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall							Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.				Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hrs.	hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	92.2	71.9	82.1	95	69	87	74	84.6	85.0	6.06	153.9	1.58	12	11	2	2		219.45	7.84	65
Bukit Jeram, Selangor ...	89.9	72.7	81.3	93	71	85	74	86.2	86.7	2.17	55.1	0.88	10	7				240.00	8.57	71
Sitiawan, Perak ...	90.0	72.7	81.3	93	69	87	75	84.1	84.4	4.65	118.1	1.58	9	6	5			237.75	8.49	71
Ipoh Aerodrome, Perak ...	92.5	71.2	81.9	96	68	88	74	83.7	84.3	5.11	129.8	1.25	13	9	5		1	225.90	8.07	68
Temerloh, Pahang ...	90.1	72.3	81.2	95	68	84	75	86.0	85.3	0.90	22.9	0.76	6	2		2		198.85	7.10	59
Kuala Lipis, Pahang ...	89.4	71.0	80.2	94	69	84	74	83.9	84.0	3.71	94.2	1.29	12	7	1	10		191.30	6.83	57
Kuala Pahang, Pahang ...	85.3	76.3	80.8	89	73	81	80	84.8	84.7	8.82	224.0	3.98	11	7			1	210.30	7.51	63
Kallang Aerodrome, S'pore ...	88.3	75.1	81.7	94	72	80	77	82.3	82.9	4.72	119.9	1.28	13	11	2			199.60	7.13	59
Bayan Lepas Aerodrome Penang ...	88.7	73.5	81.1	91	69	86	76	84.1	84.2	2.84	72.1	1.13	10	8	2			234.50	8.37	70
Bukit China, Malacca ...	89.7	74.5	82.1	95	72	85	77	85.0	84.4	0.67	17.0	0.41	3	2			1	235.50	8.41	69
Kluang, Johore ...	90.1	72.4	81.3	95	68	82	74	81.7	81.6	5.02	127.5	1.99	12	11	2	4		204.60	7.31	60
Bukit Lalang, Mersing, Johore	84.1	73.7	78.9	86	70	81	78	81.3	80.4	3.62	91.9	1.39	10	9		1	2	220.75	7.88	65
Alor Star, Kedah ...	90.9	72.2	81.5	93	69	86	75	84.1	85.0	2.09	53.1	0.89	8	6	1	3		225.70	8.06	68
Kota Bahru, Kelantan ...	87.0	72.3	79.7	91	67	85	76	82.7	83.1	2.74	69.6	0.86	10	7				228.80	8.17	69
Kuala Trengganu, Trengganu	85.5	73.2	79.3	88	70	83	77	82.2	82.7	4.58	116.3	1.16	10	7		3		215.65	7.70	64
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	73.1	62.1	67.6	79	60	66	65	71.1	71.1	6.21	157.7	1.83	12	9	1	16		177.95	6.35	53
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	73.5	53.8	63.7	76	43	69	61	69.8	70.1	5.91	150.1	1.81	12	11				174.40	6.23	52
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	73.8	58.4	66.1	78	56	68	61			6.22	158.0	1.66	11	11				184.30	6.58	55

Compiled from Returns supplied by the Meteorological Branch, Malaya.